

(PATENT)

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:	)	
Neil Holger White EKLUND et al.	)	Group Art Unit 3693
	)	Confirmation No. 5187
Serial No. 10/781,804	)	
	)	Examiner Edward J. Baird
Filed: February 20, 2004	)	
	)	Attorney Docket 141121-4
	)	
For: SYSTEMS AND METHODS FOR MULTI-OBJECTIVE PORTFOLIO ANALYSIS USING DOMINANCE FILTERING		

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**REPLY BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 CFR §41.41, this Reply Brief is filed within two months of the Examiner's Answer dated March 1, 2011, and is in furtherance of the Appeal Brief.

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This Reply Brief contains items under the following headings as required by 37 C.F.R. §41.41 and M.P.E.P. §1208:

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**I. STATUS OF CLAIMS**

A. Total Number of Claims in Application

There are 15 Claims pending in application.

B. Current Status of Claims

1. Claims canceled: 3-5, 8-10, 14, 15, 21, 25 and 26.
2. Claims withdrawn from consideration but not canceled: None.
3. Claims pending: 1, 2, 6, 7, 11-13, 16-20 and 22-24.
4. Claims allowed: None.
5. Claims rejected: 1, 2, 6, 7, 11-13, 16-20 and 22-24.

C. Claims On Appeal

The Claims on Appeal are Claims 1, 2, 6, 7, 11-13, 16-20 and 22-24.

**II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

1. Whether Claims 1, 2, 6, 7, 11-13, 16-20 and 22-24 are unpatentable under 35 U.S.C. § 103(a) over Josephson et al. (U.S. Patent No. 7,155,423, hereinafter “Josephson”) in view of Carey et al. (U.S. Patent No. 7,206,760, hereinafter “Carey”).

### III. ARGUMENT

I. In *Section 10.3* of the Examiner's Answer, the Examiner states that Josephson teaches the particular mechanics of a dominance filter, and states:

"Josephson uses a strategy of **dominance filtering** as applied to hybrid electric vehicle design (HEV), a domain in which the architecture of his invention has been tested [column 4 lines 51-67]. Design candidates are screened using four criteria [column 1 lines 54-60]. In particular, he uses trade-offs between city and highway efficiencies in miles per gallon [column 5 lines 18-33], and acceleration capacity [column 5 lines 34-48]. Examiner interprets *screening design candidates for different criteria* as indicative of Appellants' **set of solutions**. Josephson uses a computing device in his strategy (see at least column 2 lines 41-52, column 7 lines 29-39)."

Col. 4, lines 51-67 of Josephson states:

In an example embodiment, the dominance filter can be very effective. Table 1 describes the result of an experiment in the domain of hybrid electric vehicle (HEV) design, one of the domains in which the architecture of the present invention has been tested. In the final experiment, approximately 1.8 million design candidates were generated, and these were evaluated on four criteria. One thousand seventy-eight (1,078) candidates survived, giving a survivor percentage of 0.06. This filter is very effective. The user has the assurance of having examined close to 2 million design candidates in the design space, while only needing to look in some detail at about 1,000 survivors. After randomly sampling three subsets of candidates as indicated in Table 1, and running the dominance filter on them, it is clear that the percentage of survivors decreases as the number of candidates is increased. This result shows that in addition to being effective, the dominance filter scales well.

Col. 1, lines 54-60 of Josephson states:

incrementally.

Pareto optimality, as a kind of multiple-objective, or multiple criteria optimality has been considered extensively, and there is substantial prior art in this area. Techniques have been developed for generating some or all elements of a Pareto-optimal set, and for ordering or selecting from the Pareto-optimal set. Much of the work in the field has treated

Col. 5, lines 18-33 of Josephson states:

Referring to FIG. 2, an example screen display of a scatterplot of candidates after application of a filter is shown. In the HEV domain, FIG. 2 illustrates a scatterplot or trade-off diagram of candidates that survived the filter and are displayed by the Viewer, showing trade-offs between city and highway efficiencies. FIG. 2 is a scatterplot of the 1,078 survivors in the experiment in the HEV domain. The x-axis 110 is the criterion labeled "city miles per gallon" while the y-axis 112 is "highway miles per gallon." These are measures of efficiency in city and highway driving, with the electric power consumption converted to its equivalent gasoline power for standardizing the comparisons. A user viewing the screen displays can see that the two efficiencies are positively correlated, as one would expect, and can see some candidates that do better in one or another dimension.

Col. 5, lines 34-48 of Josephson states:

Referring to FIG. 3, an example screen display of a scatterplot of candidates for which a user has selected a subset of candidates is shown. In FIG. 3, the user sees that there are many cars that have time-to-60 MPH values better than 12 seconds. The user may discard all the candidates that perform worse than 12 seconds by selecting the candidates that perform at better than 12 seconds 120 and choosing to "zoom" or narrow the set of candidates under examination. If the user had not found that there were many candidates above this threshold, he might have had to compromise on this criterion and accept cars that are slower. This preference expression on his part comes out after the actual distribution of candidates is available. It would be difficult for a user to express this preference in advance of seeing the actual candidates.

Col. 2, lines 41-52 of Josephson states:

With the present invention, candidates may be composed by drawing components from a component library to generate qualitatively and quantitatively distinct candidates rapidly. under computer control, a powerful enabler for  
45 exploring large spaces of alternatives. 'Candidates' behaviors can also be derived automatically using behavioral descriptions of the components in the component library, and these derived behaviors can be used as a basis for evaluating the candidates according to multiple criteria.  
50 Many computers can be used in parallel to facilitate rapid generation and evaluation of large numbers of choice candidates.

Col. 7, lines 29-39 of Josephson states:

The architecture provides an appealing division of responsibility between the human and the machine. The user's  
30 preferences are expressed in two stages. At the first stage, he identifies the criteria that matter to him, and the computer applies this preference to pare the set of decision alternatives or candidates. Then, the user brings additional preferences during his interaction with the viewer to make a selection  
35 from this reduced set. The preferences that he brings to decision-making are typically of the sort that would be hard to state abstractly and precisely enough for automated application.

First, Appellant respectfully submits that the Examiner is incorrect in asserting that Josephson teaches that design candidates are screened using four criteria at Col. 1 lines 54-60. This passage in Josephson discusses Pareto optimization and has nothing to do with dominance filtering techniques.

Section, Appellant reiterates that Josephson does not teach or suggest the particular mechanics of a dominance filter, let alone the mechanics of fast dominance filter of the invention. Specifically, Josephson teaches the application of a classical dominance filter as mentioned in Col. 4, lines 29-44, which was neglected by the Examiner. Col. 4, lines 29-44 of Josephson states:

30 The candidates **102** are passed from the Seeker **100** to the  
Filter **104**. A subset of the candidates (filtered candidates  
106) remains after application of the Filter **104**. The Filter  
104 may employ any one of a number of filter algorithms to  
35 reduce the number of candidates to be considered. In an  
example embodiment of the present invention, a dominance  
filter may be used. In a classical dominance filter, candidate  
A is said to dominate candidate B if A is superior or equal  
to B in every criterion of evaluation and strictly superior for  
at least one criterion. The filter removes dominated candi-  
40 dates. Removing them does not entail any risk because a  
candidate is removed only when there is another candidate  
that is at least as good as it. Surviving candidates are Pareto  
optimal, i.e., there is no way to improve with respect to any  
criterion without giving up something along another crite-  
45 rion.

Attention should be directed to lines 34-39, which states: "In an example embodiment of the present invention, a dominance filter may be used. In a **classical dominance filter**, candidate A is said to dominate candidate B if A is superior or equal to B in every criterion of evaluation and strictly superior for at least one criterion. The filter removed dominated candidates." (Emphasis added).

The above passage in Josephson teaches a classical dominance filter. By contrast, the claimed invention is directed to the specific mechanics of a fast dominance filter that:

- selects a first dimension from the at least three dimensions of the portfolio performance space,
- generates bins for all remaining non-selected dimensions of the portfolio performance space,
- determines a solution in each bin of the non-selected dimensions with a maximum value along the selected dimension,
- compares the solution with the maximum value in each bin to other solutions in each bin to determine whether the other solutions are dominant solutions or dominated solutions, and
- removes the dominated solutions from the portfolio performance space so as to result in a reduced set of solutions. (Emphasis added).



It is the reduced set of solutions underlined above resulting from the culmination of the preceding steps is what produces the fast dominance filter of the claimed invention, and it is the combination of these steps that is not taught or suggested in the applied art.

For at least this reason, Appellants respectfully request reversal of rejection under 35 U.S.C. §103.

In view of the foregoing, Appellant respectfully submits that the application is in condition for allowance. Favorable consideration and prompt allowance of the application is earnestly solicited.

Dated: May 2, 2011

Respectfully submitted,

By /Peter J. Rashid/

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